PATENT CLAIMS

1. Assembly composed of a membrane-electrode unit "MEA" (8, 4a, 4b) and a bipolar plate (1) of a fuel cell as component of a fuel cell stack, wherein the MEA comprises a polymer electrolyte membrane (8) and a gas diffusion layer (4a, 4b) resting in the assembly on the membrane with the exception of the membrane periphery, with the bipolar plate (1) resting against the side of the gas diffusion layer opposite the membrane and protruding over the periphery of the gas diffusion layer while forming a circumferential marginal volume zone that is defined at the top, inner and bottom sides by the bipolar plate (1), the gas diffusion layer (4a, 4b) and the membrane (8), characterized in that the circumferential volume zone is filled with a cured adhesive (7) all the way to its defining faces in a gap-free and gas-tight manner.

2. Assembly composed of a bipolar plate and an MEA in accordance with Claim 1, characterized in that the hydrogen side of the bipolar plate (1) is glued together with the anode side of the MEA (8, 4a, 4b).

3. Assembly composed of a bipolar plate and an MEA in accordance with Claim 1 ~~or 2~~, characterized in that the adhesive (7) penetrates into the gas diffusion layer (4a) 0.2 mm to 1 mm.

4. Assembly composed of a bipolar plate and an MEA in accordance with ~~any of Claims 1 through 3~~ Claim 1, characterized in that the hardened adhesive (7) is a cured silicone or an epoxy resin.

5. Assembly composed of a bipolar plate and an MEA in accordance with ~~any of Claims 1 through 4,~~ characterized in that the bipolar plate (1) and/or the membrane (8) has been pretreated with a bonding agent in the area of the adhesive.

6. Assembly composed of a bipolar plate and an MEA in accordance with ~~any of Claims 1 through 5,~~ characterized in that the peripheral zone of the bipolar plate (1), which has been bonded with the cured adhesive (7), and the surface of its gas distribution structure (6) are located flush in one plane.

7. Assembly composed of a bipolar plate and an MEA in accordance with ~~any of Claims 1 through 6~~, characterized in that in the area of anode and/or cathode gas conducts, also such volume zones which are defined at the top, exterior and bottom sides by the bipolar plate (1), the gas diffusion layer (4a, 4b) and the membrane (8) and which surround the gas conducts (2a, 2b), are filled with a cured adhesive in a gap-free and gas-tight manner.

8. Method for producing a gas-tight assembly composed of at least one bipolar plate and at least one membrane electrode unit "MEA" ~~in accordance with any of Claims 1 through 7~~, characterized in that for filling a circumferential marginal volume zone that is defined at the top, inner and bottom sides by the bipolar plate (1), a gas diffusion layer (4a, 4b) and the membrane (8) in a sealing manner a free-flowing adhesive is initially applied to the margin of the membrane or the bipolar plate in the form of an adhesive bead that is higher than the gas

diffusion layer and whose volume is dimensioned so as to completely fill the mentioned volume zone, and that the adhesive is then brought into the shape of the volume zone by assembling the assembly composed of the membrane, the gas diffusion layer and the bipolar plate and is permitted to cure.

9. Method in accordance with Claim 8 for a reaction between hydrogen and oxygen, characterized in that the hydrogen side of the bipolar plate or of the MEA is glued by applying the adhesive to the hydrogen side of the bipolar plate or of MEA.

10. Method in accordance with Claim 8 ~~or 9,~~ characterized in that the adhesive is allowed to penetrate into the gas diffusion layer by 0.2 mm to 1 mm before curing.

11. Method in accordance with ~~any of Claims 8 through 10,~~ Claim 8 characterized in the gluing process is performed with a curable silicone or an epoxy resin.

12. Method in accordance with ~~any of Claims 8 through 11,~~ Claim 8 characterized in that the bipolar plate and/or the membrane are pretreated with a bonding agent in the area of the adhesive.

13. Method in accordance with ~~any of Claims 8 through 12,~~ Claim 8 characterized in that a vacuum clamping table is utilized for positioning the MEA with or without gas diffusion layers on the bipolar plate.

14. Method for producing a gas-proof assembly according to Claim 7 which assembly comprises anode and/or cathode gas conducts, ~~in accordance with any of Claims 8 through 13,~~ characterized by the fact that at least one of the gas

conducts (2a, 2b) conveying the gas, which is not to penetrate into the gas chamber of the assembly, is sealed by a gluing process with the adhesive as described for the marginal volume zone.

15. Application of the assembly composed of a bipolar plate and an MEA in accordance with ~~any of Claims 1 through 7~~ Claim 1 in fuel cell stacks and/or piles of electrolysis cells where several assemblies composed of a bipolar plate and an MEA ~~according to any of Claims 1 through 7~~ are connected electrically in series by stacking.